COASTAL PLAIN SEMIPERMANENT IMPOUNDMENT (SANDHILLS MARSH SUBTYPE)

Concept: Coastal Plain Semipermanent Impoundment communities are ponded wetlands produced by beaver dams or by long-established man-made dams that produce similar ponds.They include drained impoundments whose vegetation remains distinct from other floodplain communities. The Sandhills Marsh Subtype covers herbaceous-dominated zones or ponds of the Sandhills Region, where sediment input is minimal and muck substrate predominates. It includes both shallow water edges of active ponds and marshy vegetation in drained ponds.

Distinguishing Features: Coastal Plain Semipermanent Impoundment communities are distinguished by occurrence in the Coastal Plain in active or recently drained beaver ponds or in artificial ponds that have a similar environment and vegetation. Drained beaver ponds are treated as Semipermanent Impoundments until they become more similar to another floodplain or streamhead community.

The Sandhills Marsh Subtype is distinguished from the Cypress–Gum Subtype by dominance of emergent herbaceous vegetation and by the lack of a substantial tree or shrub canopy. However, *Nyssa biflora* trees remaining from before impoundment may be present with limited cover, and shrubs generally establish around the edges. The Typic Marsh Subtype is distinguished from the Sandhills Marsh Subtype by substantial floristic differences that correlate with nutrient richness and mineral or boggy character. Species indicative of the Typic Marsh Subtype and not known in the Sandhills Marsh include most *Persicaria* spp., *Typha latifolia, Leersia hexandra, Saururus cernuus, Cladium jamaicense*, *Sacciolepis striata, Scleria muhlenbergii,* and *Rhynchospora macrostachya*. Species indicative of the Sandhills Marsh Subtype include *Schoenoplectus subterminalis, Eriocaulon decangulare, Carex glaucescens, Carex striata,* most *Eleocharis* spp., *Schoenoplectus etuberculatus, Orontium aquaticum,* and *Sphagnum* spp.

The Sandhills Marsh Subtype is distinguished from the Sandhills Mire Subtype by having only a limited woody component. The Sandhills Mire Subtype has a well-developed shrub layer and often trees. However, the differences in herbaceous flora that once were thought to distinguish the two do not appear to work well. Of the species listed in earlier versions of the 4th Approximation as characterizing the Sandhills Mire Subtype — *Carex mitchelliana, Carex howei, Carex stricta, Glyceria obtusa, Leersia oryzoides, Dichanthelium scabriusculum, Peltandra virginica*, *Dichanthelium dichotomum, Dulichium arundinaceum, Triadenum virginicum, Lycopus cokeri, Eupatorium resinosum, Carex atlantica* and *Woodwardia areolate* — most can be found in examples of the Sandhills Marsh Subtype.

Synonyms: *Orontium aquaticum - Schoenoplectus (etuberculatus, subterminalis) - Eriocaulon decangulare - Juncus trigonocarpus* Herbaceous Vegetation (CEGL007860).
Ecological Systems: Atlantic Coastal Plain Blackwater Stream Floodplain Forest (CES203.247).

Sites: The Sandhills Marsh Subtype occurs on floodplains of streams in the Sandhills Region. This subtype typically occurs on the edges of active beaver ponds or in beds of recently drained ponds.

Soils: Typical soils of Sandhills Region streams are Bibb and Johnston (Typic Fluvaquents and Cumulic Humaquepts). These soils are generally high in organic matter and are kept constantly saturated by the seepage of water from the adjacent porous soils. As such, they may be changed less by impoundment than most, but presumably become more anoxic. Over time, accumulated organic matter rather than transported mineral sediment tends to fill the Sandhills ponds.

Hydrology: The Sandhills Marsh Subtype may be permanently or nearly permanently flooded to shallow depths or may be unflooded but permanently saturated. Drained or partially drained ponds may have no standing water. While beavers generally prefer second order streams (Snodgrass 1997), the stable stream flow characteristic of Sandhills creeks may make smaller creeks attractive while also making higher order streams stable enough for dams.

Vegetation: The vegetation of the Sandhills Marsh Subtype is dominated by emergent herbaceous plants. The species composition is extremely variable and is not well documented. Species that have been noted as patch dominants or as abundant in some sites include *Sparganium americanum*, *Dulichium arundinaceum*, *Rhynchospora* spp., *Schoenoplectus subterminalis*, *Carex striata*, *Glyceria obtusata*, *Eleocharis robbinsii*, *Eleocharis quadrangulata*, *Orontium aquaticum*, and *Iris virginica*. Species that were noted relatively frequently include *Scirpus cyperinus*, *Andropogon glomeratus*, and *Carex glaucescens*. Other species include *Juncus abortivus*, *Juncus canadensis*, *Juncus effusus*, *Juncus coriaceus*, *Juncus repens*, *Carex intumescens*, *Carex atlantica*, *Carex lonchocarpa*, other *Carex* spp., *Dichanthelium scabriusculum*, *Eleocharis tuberculosus*, *Eleocharis equisetoides*, *Rhynchospora chalarocephala*, *Rhynchospora macra*, *Xyris fimbriata*, *Xyris caroliniana*, *Xyris smalliana*, *Sagittaria engelmannii*, *Sagittaria graminea*, *Eupatorium resinosum*, *Lycopus cokeri*, *Rhexia mariana*, *Proserpinaca pectinata*, *Hydrocotyle umbellata*, *Triadenum virginianum*, and *Solidago patula* var *strictula*. *Sphagnum* is sometimes abundant. Aquatic species such as *Nymphaea odorata* or *Brasenia schreberi* may be present in small numbers amid the emergent vegetation. Woody plants may be absent, may consist of sparse trees and shrubs remaining from before impoundment, or may consist of sparse-to-dense young individuals invading the marsh after pond drainage. While woody species general to open wetlands, such as *Viburnum nudum*, *Vaccinium formosum*, or *Acer rubrum*, may be present, pocosin species such as *Lyonia lucida*, *Cyrilla racemiflora*, *Magnolia virginiana*, *Clethra alnifolia*, and *Smilax laurifolia* are more typical.

Range and Abundance: Ranked G2?. This community may potentially be found anywhere in the Sandhills Region, but examples have been documented primarily from the large public lands of the region and are scarce. Similar communities presumably occur in South Carolina but it is unclear if they range any more widely. It is possible that ponds of this character could occur elsewhere in the Coastal Plain, but no examples have been found. The combination of low mineral sediment input and long-term saturation by seepage is scarce outside the Sandhills.

Associations and Patterns: It is common for beaver ponds of the Open Water Subtype and Sandhills Marsh Subtype to occur interspersed with reaches of Sandhills Streamhead Swamp and Streamhead Pocosin along the streams. Ponds sometimes are single and sometimes are in complexes with multiple active and abandoned dams, with multiple patches of Open Water and Sandhills Marsh Subtype; other ponds or complexes may consist entirely of the Sandhills Marsh

Subtype. They are often bordered by Streamhead Pocosin but can be bordered by upland communities.

Variation: This subtype is currently defined more narrowly than other marsh subtypes, but nevertheless is extremely variable. A very wide range of species may dominate patches. Among species lists available for this community, virtually no species has as much as 50% constancy and, more than in most communities, a large proportion of species has been noted in only one or two examples.

The physical typology of beaver ponds and pond clusters described by Krues and Bason (2015) and summarized under the Open Water Subtype may be useful.

Dynamics: See the more extensive discussion of general beaver pond dynamics under the Open Water Subtype.

These communities can form fairly rapidly when a pond is built, but may be slower to develop than the Open Water Subtype because the shallower water may take longer to kill the existing trees. Some live trees, generally showing signs of stress, are present for some time, before they eventually succumb to the flooding or are cut by the beavers. Snags may be abundant for several years. The role of stumps and fallen logs in providing microsites for plants of drier sites is even more important in this subtype than in the deeper water. Establishment of some herbaceous vegetation can be rapid, but the community continues to develop and change in composition and diversity with time. It is unknown how much of the tremendous variability observed is related to duration of impoundment in addition to variation in flooding conditions.

The Sandhills Marsh Subtype may also spread rapidly into deeper parts of the pond when a dam is abandoned. It may be invaded by woody vegetation rapidly or slowly. It may potentially succeed to the Sandhills Mire Subtype, Cypress–Gum Subtype, or return to a Sandhills Streamhead Swamp. However, if part of the dam remains, it may retain enough water to prevent woody invasion and to allow the marsh to persist for some years. It appears that this phenomenon may be more common in the Sandhills than in other regions. Lee Gerald (personal comm. 1990s) described the successional trend of Sandhills beaver ponds: Sphagnum comes in quickly in drained ponds, and sedge-grass vegetation develops on this. Shrubs and trees, especially *Acer rubrum, Alnus serrulata,* and *Cyrilla racemiflora* invade the marsh over the space of 10-20 years, starting from the head of the pond and the edges. *Nyssa biflora,* persisting through the impoundment or newly established, along with *Acer rubrum*, tends to dominate the drained pond bed, with herbaceous cover beneath. This presumably represents the Sandhills Mire Subtype. Former ponds remained hardwood dominated and did not return to Streamhead Pocosin after 40 years, but it is unclear when, or if, they became Sandhills Streamhead Swamp rather than remaining as the Sandhills Mire Subtype.

Comments: The vegetation of Coastal Plain Semipermanent Impoundment subtypes is not well studied. Very few CVS plots exist. Sites descriptions often do not document their vegetation in great detail. In addition, many examples are relatively new and were not present at the time of older site descriptions.

The classification of the Sandhills Marsh and Sandhills Mire subtypes needs further consideration and possible revision. The Sandhills Mire Subtype was based on quantitative data on drained ponds on Fort Bragg (Hall 2005), but comparable data are not available elsewhere in the Sandhills. There are believed to be significant floristic differences between the mires of Fort Bragg and ponds elsewhere, but the relationship between those floristic differences and the successional stages of drained ponds remains unclear. Accumulation of species lists for ponds in the Sandhills Game Land indicates that the floristic differences among these areas are not strong, and now appear to be less than the variation among ponds within each area. Since both early and late successional stages must occur in both places, the distinction needs to be clarified to be either a structural/successional one, or a more useful floristic split needs to be identified.

See the Typic Marsh Subtype and other subtypes for general comments and references on beaver ponds, landscape diversity, and ecosystem services. Because Sandhills beaver ponds accumulate more organic matter, and are less subject to erosion by severe floods, they may be even more important in sequestering carbon.

References:

Hall, S.P. 2005. A quantitative analysis and classification of the habitats of *Neonympha mitchelli francisci* at Fort Bragg and Camp Mackall. Report to Endangered Species Branch, Fort Bragg. Contract No. W912747–04-P0324.

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